

# PATENT ABSTRACTS OF JAPAN

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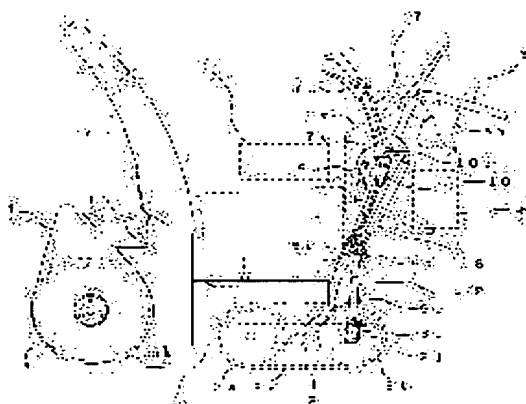
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## (54) SMALL-SIZED SNOWPLOW

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To improve efficiency of snow clearing work by solving burdens of operation force and problems in position fixing methods in manual operation methods in height adjustment to a snow plowing part in a small-sized snowplow for enabling it to be safely and easily operated even by the aged or females.

**SOLUTION:** Constitution of an upper frame installing main functions for plowing snow such as a snow plowing part, a motor, an operation panel, an operation handle, etc., is rotatably journaled and connected to part of constitution of a lower frame installing a traveling part comprising wheels and crawlers. The upper frame is manually rotated using a connection part as a support shaft. As an operation assisting means to adjust a height position of the snow plowing part, links related to rotation are journaled and connected to part of the upper frame and part of the lower frame. A cylinder type expansion device is installed to part of the link for either of them, and part o the upper frame or part of the lower frame.



## LEGAL STATUS

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CLAIMS

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[Claim(s)]

[Claim 1] The small snowblower characterized by considering as the configuration which is equipped with the stepless location locking device connected with the link mechanism connected with the airframe, the lever fixed to this a part of link, and the part and airframe of this link in the small snowblower which can adjust the height location of the snow removal section, and performs snow removal section height adjustment by actuation of this lever.

[Claim 2] The up frame structure which equips connection of said link with snow removal main functions, such as the snow removal section, a prime mover, a control panel, and an actuation handle, By making rotation freedom carry out support connection of the lower frame structure equipped with the transit sections, such as a wheel and a crawler, and rotating an up frame manually by using the connection section as a pivot The small snowblower according to claim 1 which carries out support connection in the configuration which adjusted the height location of the snow removal section so that it may be involved at this rotation in a part of up frame structure and a part of lower frame structure.

[Claim 3] The small snowblower according to claim 1 or 2 which fixes fixation of said lever to the part which extended any one of said any one link [ a part of ] or said the links.

[Claim 4] A small snowblower given in any 1 term of claim 1 to claim 3 which supports connection of said stepless location locking device pivotably for an end in the part which extended any one of said any one link [ a part of ] or said the links, and already supports an end pivotably in a part of up frame structure or a part of lower frame structure.

[Claim 5] A small snowblower given in any 1 term of claim 1 to claim 4 which uses the pivot of rotation of said up frame as the knuckle spindle of the transit section.

[Claim 6] A small snowblower given in any 1 term of claim 1 to claim 5 which enabled it to operate said stepless location immobilization on said lever.

[Claim 7] A small snowblower given in any 1 term of claim 1 to claim 6 characterized by using the gas spring of a cylinder mold expansion device or gas, and oil mixture for said stepless location locking device.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the improvement in working capacity and the improvement in operability concerning the snow-removal section height-adjustment approach with the snow-removal section 1 mainly constituted by auger 1a (equipment which scratches, breaks down, or \*\*\*\* and collects snow), blower 1b (equipment which makes snow breathe out), and shooter 1c (equipment which defines a discharge direction) of a small rotary snow remover.

[0002]

[Description of the Prior Art] In case adjust snow removal section height in order to decide the snow removal height of snow-removal work, or the snow removal section is lowered to below a transit side at a certain time or the snow removal section is highly raised for (a cut) or migration, a large-sized machine is usually performed using an oil hydraulic cylinder or an electric cylinder. (For example, JP,6-23445,B) although some approaches are devised as low-pricing, lightweight-ization, etc. being aimed at in the case of a small machine, and on the other hand being able to operate them easily also manually -- a typical thing -- a part for the anterior part of the transit section -- a pivot -- taking (for example, knuckle spindle) -- rotation -- it is made operational and enables it to adjust snow removal section height Although there is also a rear wheel support shaft method in part (JP,2000-186312,A), it is a thing in the case of being close to a medium size machine, and since it is general to use an anchor-wall clutch (snowblower insurance conference glossary) for a transit clutch and a snow-removal work clutch in a small machine, a knuckle-spindle pivot method is in use. Carrying out rise-and-fall actuation of the thing of 100 or more Kgws by human power from the former, although it is a small machine had unreasonableness, and the problem of an operating-physical-force burden and operability was in the sake. Moreover, because of hand control, although it is height adjustment, it became mechanical immobilization (slot, cutting, writing and biting gear tooth), and was limited to 4-5-place \*\*\*\*\*, and the snow-removal work degree of freedom was also low. There are some which maintain weight balance and could be made to carry out rotation actuation before and behind the rotational pivot easily also manually at the time of the first stage. (For example, JP,57-12022,Y, JP,3-107008,A) However, by these approaches, it cannot say that the problem of operability and an operating-physical-force burden solved enough, but there are some (JP,2000-290951,A) which could adjust what equipped one of the technical-problem solutions with the power assistant device in recent years (JP,11-29914,A), and a rise-and-fall location on the stepless story, and aimed at improvement in operability.

[0003]

[Problem(s) to be Solved by the Invention] However, in the case of the former, although weight balance, the repulsive force of a coil spring, and the energization force are combined skillfully and the rotation operability of a snow removal height control lever is raised, assisting a lever [ whole region / which is rotated about about 90 degrees ] by the coil spring has unreasonableness. Side [ the side which lengthens a lever as a result ], i.e., when raising the snow removal section, priority was given to the side which catches aircraft weight by spring repulsive force, and the energization force by the spring of the side which pushes down a lever, i.e., when lowering the snow removal section, is almost ineffective. It cannot be said that the operating physical force of the lever in this method is a length side, is a 120-N [ a maximum of ] (12Kgf) and push side, and is set to a maximum of 180 Ns (18Kgf), and its operability is improving enough. Since it bites since it is necessary to take long spring free length even if it sees structurally, and troublesome problems, such as a lump clip lump, newly occur and the sliding section slide contact section is used abundantly, it is easy to exhaust and is easy to break down. On the other hand, although made as for snow removal height adjustment to a stepless story in the case of the latter, rotation actuation of rise and fall is the

conventional thing which performs right-and-left both handles only by grip human power firmly with both hands to the last. Making a heavy lift with actuation difficult from the first by the hand into manual system only by maintaining weight balance has unreasonableness. Since it will be proportional to the magnitude of rotation displacement and a hand load will increase, it becomes actuation dangerous to weak elderly people and woman. It comes out as hard as possible only by supporting aircraft weight in the both-hands whole body, and an operator who is the aim of this method and who can adjust does not have the effectiveness which it was ineffective only to those who were restricted extremely, and brought the tilt lever to the handle position, carrying out snow-removal work. First of all, it is adopted in order to make it concentrate on snow-removal work so that other actuation cannot do the anchor-wall clutch type for small machines during snow-removal work by considering safety as the ability being used for insurance at anyone, and it moves also against safety.

[0004] Therefore, this invention solves the above-mentioned problem in the manual operation approach of the snow removal section height adjustment of a small snowblower, and elderly people and a woman also aim it at insurance and enabling it to operate it easily and aiming at improvement in snow-removal work efficiency.

[0005]

[Means for Solving the Problem] The technical means provided in this invention in order to solve the above-mentioned technical problem The up frame structure equipped with snow removal main functions, such as the snow removal section, a prime mover, a control panel, and an actuation handle By carrying out support connection to rotation freedom at a part of lower frame structure equipped with the transit sections, such as a wheel and a crawler, and rotating an up frame manually by using the connection section as a pivot In the small snowblower which adjusted the height location of the snow removal section, support connection of the link mechanism which starts a part of up frame structure and a part of lower frame structure at said rotation is carried out. The rise-and-fall control lever of the snow removal section is fixed to the part which extended any the one link [ a part of ] or any one link. Moreover, it is having supported pivotably the end of the cylinder mold expansion device which can carry out arbitration location immobilization at the stepless story in the part which extended any one link [ a part of ] or any one link, and having considered as the configuration which is the expansion device and which already supports an end pivotably in a part of up frame structure or a part of lower frame structure. Furthermore, it is having enabled it to operate arbitration location immobilization on said rise-and-fall control lever, and having used the gas spring of gas and oil mixture for the cylinder mold expansion device.

[0006]

[The gestalt of the stereo of invention] Consequently, it becomes the load suddenly rotation whose conventional method the rise-and-fall operating physical force of the snow removal section could mitigate sharply, and suited, and a hand is taken by a handle and the lever, or raising both handles by the force of \*\*\*\* is completely lost, and anyone can be safely operated now comfortably (elderly people and woman). Since the accommodation immobilization of the snow removal section height location was freely carried out on a stepless story at coincidence, delicate control of the snow removal section height location according to a snow removal load is attained, and a snow-removal work degree's of freedom improves, and snow-removal work nature came to improve remarkably. Furthermore, the need of the design of an operating physical force being attained only by a part of link die length and selection of a gas spring by making it this configuration, and considering weight balance is lost, and the weight balance which pursued the engine performance of snowblower original can be designed now. The problem to which the operability design which was a technical problem, and the snowblower engine performance are contrary could also mainly be conventionally solved with the front-wheel pivot mold, and the engine performance of snowblower original also improved.

[0007]

[Example] The example of this invention is explained based on an accompanying drawing. This example is shown in drawing 1 and drawing 2 . Drawing 1 is the side elevation of the small snowblower in which this example is shown. The left-hand drive of a near side is removed for explanation. Drawing 2 is drawing which saw the small snowblower in which this example is shown from the back, i.e., actuation handle, side. an explanation also with drawing 1 drawing 2 sake -- except for this configuration -- schematic drawing -- or it has omitted. (An engine, missions, a dc-battery, a control panel, a gearshift lever, a transit clutch, activity clutch, etc.)

[0008] The engine 4 which is the prime mover of a snowblower is carried in the up frame 2, and the frame edge is equipped with the snow removal section 1 which consists of auger 1a, blower 1b, and shooter 1c.

Moreover, the snowblower actuation handle 6 is fixed to the frame edge which faces a snow removal section wearing side, and control-panel 6a of a snowblower is fixed to the actuation handle 6. The actuation handle 6 has symmetrical composition to the up frame 2. The sign of bilateral symmetry components is distinguished in drawing 2. (Namely, right-hand side components - R, left-hand side components - L) Snow throwing of the snowblower is carried out in the direction which scratches, breaks down, or \*\*\*\* and collects snow by auger 1a driven with an engine 4, and is made to breathe out snow by blower 1b, and a pilot operates by shooter 1c. A pilot can perform snow-removal work, operating the snow-removal work clutch which has entered and carries out the rotation drive of transit clutch and auger 1a while grasping the actuation handle 6-6 and the rise-and-fall lever 7 which is arranged in control-panel 6a and adjusts the snow removal section height which is this design, a gearshift lever, etc.

[0009] on the other hand, this frame is equipped with the lower frame 3 -- the transit section is constituted mainly from front-wheel (driving wheel) 3a, rear wheel (coupled driving wheel) 3b, and crawler 3c, and it is connected by the up frame 2 free [ rotation with a knuckle spindle ]. The snow removal section 1 can rotate a knuckle spindle up and down as a pivot.

[0010] The configuration of the snow removal section rise-and-fall actuation device which is this invention is explained based on drawing 1 and drawing 2. Horizontal-bridging fixing of the wearing bar 10 which equips the actuation handle 6-6 with this component was carried out at the abbreviation horizontal, two wearing brackets 10a and 10b were fixed on this bar, and pivot 10c has fixed on this bracket 10a and 10b further at the abbreviation horizontal. Although this pivot 10c is equipped with the rise-and-fall lever 7 of this invention, and the usual gearshift lever, the latter is omitted by a diagram. Color 7b which fixed arm 7c which carries out support connection of the tip of the bearing bar 9 extended from arm 7a which fixed the rise-and-fall lever 7 to this pivot 10c, and down by swivel-joint 9a etc. at rotation freedom is supported to revolve by rotation freedom. Arms 7a and 7c and color 7b can be rotated around pivot 10c by actuation and one of the rise-and-fall lever 7. On both sides of pivot 10c on arm 7a, the rise-and-fall lever 7 and the end of the cylinder mold expansion device 8 later mentioned at the receiving edge are supported to revolve and connected with rotation freedom. Like bracket which end has already fixed to actuation handle 6-R 6 which is expansion device 8 a, it is supported to revolve by rotation freedom and connected. It is fixed in the bracket 3d center of abbreviation which is a bearing bar 9 and which bracket 9b already fixes at the end, and is supported to revolve by rotation rotation freedom at rear wheel shaft 3c.

[0011] Crossover 4 link frame formation which considers as a link Rhine (there is nothing to drawing) to which the axis of a bearing bar 9, arm 7c, 1 more pivot 10c, and front-wheel 3a is connected with the above configuration for between the axes of front-wheel 3a and rear wheel 3b as one link is carried out. Among four links, except inside two, the die length is limited mostly, the die length of arm 7c and a bearing bar 9 is set up suitably, and the vertical location of the wearing bar 10 also becomes settled from the magnitude of an airframe, weight, operating specification (specification of a rotation angle and the rise-and-fall lever 7), etc. By rotating arm 7c of it and one by rotation actuation of the rise-and-fall lever 7, rise and fall of the snow removal section 1 are performed, when the locus of pivot 10c rotates focusing on the axis arm of front-wheel 3a. It can equip with the cylinder mold expansion device 8 with which it can change into actuation before and after basing on the rise-and-fall lever 7 which actuation tends to carry out from vertical actuation of the hand by the conventional actuation handle 6-6, and actuation is assisted by the optimal busy condition. In this example, the gas spring of the gas oil mixture with a free lock device was used for this expansion device 8.

[0012] The configuration of a gas spring (expansion device) 8 is explained based on drawing 3 and drawing 4. It is drawing in which drawing 3 shows an appearance and drawing 4 shows an internal configuration. It mainly consists of cylinder 8a, piston 8m, and piston rod 8b. On the tip of cylinder 8a, bracket 8c for axial connection for installation fixes, and bracket 8d for axial connection for installation puts bracket 8e for wire cable wearing between the tip of piston rod 8b which faces it with a nut, and is being fixed to it. ( Drawing 3 ) Piston 8m is equipped with spool-valve 8k, usually the pressure of 8h of gas chambers was received through free-piston 8i and oil pressure room 8j at the time, it has closed cage festival 8n, and it is locked piston 8m in the location. In push-rod 8g, if push bulb 8k is opened, the oil pressure rooms 8j and 8o will be open for free passage through cage festival 8n, and migration of piston 8m will be attained. piston 8m from a difference of each piston 8m oil pressure room cross section -- the direction of elongation of regular piston rod 8b -- the stroke whole region -- although a flat thrust occurs, if the force which opposes it and is stuffed into piston rod 8b is applied, piston rod 8b will be shrunk. Flexible actuation is performed very smoothly by the cage festival 8n damper effectiveness. When the push-rod 8g push force is opened, \*\* spool-valve 8k is closed and piston 8m and piston rod 8b are locked in the location. ( drawing 4 ) wire cable 7f with which

wire bracket 8e is usually equipped -- push push-rod 8g by pulling up push lever 8f which pulled the inner wire and was supported to revolve, and making it rotate. ( Drawing 3 )

[0013] Although there is another thing of only a gas chamber in a gas spring with a free lock device and this one is more common, it is excellent that there is no constraint of that the direction of a gas oil hybrid formula goes across a chair, a rise-and-fall bed, trunk closing motion, etc. throughout a piston stroke, and the almost big damping force in a flat, restraint, and the elongation force are acquired and the installation direction etc., and it is highly efficient-like. [ Rise and fall ] (A weight door, a rise-and-fall table, a rise-and-fall desk, hydro pneumatic suspension, etc.)

[0014] The operating instructions of a snow removal section rise-and-fall actuation device are explained based on drawing 1 and drawing 2 . The rise-and-fall lever 7 is equipped with wire lever 7d which pulls the wire in wire cable 7e. If this wire lever 7d is grasped, the wire in wire cable 7f will be pulled, push lever 8f of a gas spring 8 will be pulled, push-rod 8g will be pushed ( drawing 3 ), and a gas spring 8 will become flexible freedom. When rotation actuation (it is operated on control-panel 6b approximately), i.e., rise-and-fall actuation of the snow removal section 1, centering on pivot 10c of the rise-and-fall lever 7 can be performed where wire lever 7d is grasped, and the grip which is wire lever 7d is opened, the flexible location of a gas spring 8 is locked in the location, and the height of the snow removal section 1 is fixed in the location.

[0015] The principle of a snow removal section rise-and-fall actuation device is explained based on drawing 1 and drawing 2 . The rotation actuation configuration of the up frame which uses the axle of front-wheel 3a as a pivot is made into said crossover 4 link frame formation, and the effectiveness which it sees only by changing into rotation actuation of the rise-and-fall lever 7 from rotation actuation of the actuation handle 6, and arm die length in connection with the upper rotation can be lengthened (lever ratio), and can mitigate a hand load burden is. In this example, the effectiveness of being about 4 times many as this is acquired. On the other hand, although the part rotation angle increases and has become 80 degree of lever rotation \*\*\*\* to 20 degree of handle rotation \*\*\*\*, it can perform more finely height adjustment of the part snow removal section 1 conversely. However, most small machines of the problem of an operating-physical-force burden are insufficient only at this, in this example, the gas spring 8 with a free lock was supported pivotably, respectively for a part of arm 7a in extension of 1 arm 7c of said link, and a part of actuation handle 6 which is one of the up frame structures, and they are equipped with it. It becomes possible to control rotation of 1 arm 7c of said link by this configuration. The simple rotation which uses front-wheel 3a as a pivot is decomposed into rotation with rotation of three links and the link itself among said links which use front-wheel 3a and rear wheel 3b as a pivot, and the movement toward the whole link is controlled only by rotation of arm 7c which is one of the links, and can be restrained. The end of installation of a gas spring 8 to a sake can be brought to an up frame side. Since it is control of the rotation actuation to the lower frame of an up frame, the end of a gas spring 8 is the result of developing the effectiveness of crossover 4 link further, although being attached in a lower frame side originally is natural (it does not interfere even if such, of course).

[0016] By making it this configuration, wearing of a gas spring 8 is easy and there is effectiveness which was excellent in many (arm 7a, 7c die length) -- adjustment of the operating physical force of the rise-and-fall lever 7 which does not take a location, and which gas pressure is small and ends can set up easily. By the side which lengthens the rise-and-fall lever 7 to the front, grasping wire lever 7b, and raises the snow removal section 1 above, it responds to a part of load of the up frame 2 with the gas pressure of a gas spring 8, and is energized by the piston 8m [ of a gas spring 8 ] ( drawing 4 ) thrust at the side which lowers the push snow removal section 1 ahead conversely. Moreover, if a wire lever 7d grip is opened, the snow removal section 1 is fixed immediately in the location. Although it is visible to the irrational configuration which responds to the load of the up frame 2 by itself apparently, said two links extended from each axle of Wheels 3a and 3b on the up frame 2 to the lower frame 3 have caught.

[0017] The operating physical force of the rise-and-fall lever 7 can be reduced to 40-80N (\*\*4-8Kgf) both the sides pushed the side to lengthen, and is set to the level which is equal to the motor operation or hydraulic operation of a large-sized machine, and anyone came to be able to do height adjustment of the snow removal section 1 comfortably the above result (elderly people and woman). Moreover, since the height of the snow removal section 1 was fixable to the stepless story in the location of arbitration, it came to be able to perform freely snow removal height adjustment according to a snow removal load, and snow removal capacity's on real use improved.

[0018] The physical relationship of the lever 7 at the time of fixing the rise-and-fall lever 7 to drawing 8 , and fixing the length snow removal section 1 to the best location for the case where actually operated this

example to drawing 7 , pushed down the rise-and-fall lever 7 to the limit of the front, and the snow removal section 1 is fixed to the lowest location, to the limit of this side, a handle 6, a bearing bar 9, a gas spring 8, etc. is shown. The gas cylinder 8 has shrunk in elongation and drawing 8 at drawing 7 . There is drawing 1 which showed this operation configuration in the middle, and it usually shows the airframe posture at the time of snow-removal work. It is the airframe posture of drawing 7 at the time of the so-called cut snow removal which makes the lowest side of the snow removal section 1 below the transit side A. It is difficult also with the rise-and-fall lever which receives resistance of a snow surface in the snow coverage a snow coverage side, especially whose beginning of spring became tight with the conventional method, and does not have power assistance by the ordinary male operator or the actuation handle 6 again, either. Conversely, even when a powerful sturdy male operator operates it, it is difficult to waste the force in the snow removal section in the direction which lifts the whole snowblower at the supporting point, and to take this airframe posture. It is the airframe posture of drawing 8 at the time of snowblower migration. It is difficult to receive the maximum load of an up airframe by the conventional method in the lowest location of the actuation handle 6, and for an ordinary male operator to also take this airframe posture. By considering as this operation configuration, it can carry out now easily and these snow removal height adjustment of the former very difficult small snowblower became whom or (elderly people and woman) insurance, and the small snowblower that original anyone can use.

[0019] The layout in the conventional rise-and-fall manual control with lever is shown for the layout of actuation equipment arrangement of control-panel 6b of this example in drawing 6 at drawing 5 . In this example, lever slot 6c which guides rotation actuation of the rise-and-fall lever 7 is straight. ( Drawing 5 ) In one of the conventional methods, this was formed in six cc of notching slots, the lever ( drawing 6 ) was put into this notching slot, and the height location of the lump snow removal section was fixed. The engine-performance difference of operability and fixed position adjustment is made clear. Drawing 5 shows the actuation handle 6-6 which equipped others with cross switch 6e which controls the direction of 6d of gearshift levers, and shooter 1c by the motor, light 6f, the grip, and the anchor-wall clutch lever.

[0020]

[Effect of the Invention] This invention the up frame structure equipped with snow removal main functions, such as the snow removal section of a small snowblower, a prime mover, a control panel, and an actuation handle By carrying out support connection to rotation freedom at a part of lower frame structure equipped with the transit sections, such as a wheel and a crawler, and rotating an up frame manually by using the connection section as a pivot In the small snowblower which adjusted the height location of the snow removal section, support connection of the link mechanism which starts a part of up frame structure and a part of lower frame structure at said rotation is carried out. The rise-and-fall control lever of the snow removal section is fixed to the part which extended any the one link [ a part of ] or any one link. To moreover, the part which extended any one link [ a part of ] or any one link The end of the cylinder mold expansion device which can carry out arbitration location immobilization is supported pivotably on a stepless story, and it has the effectiveness of the following [ having considered as the configuration which is the expansion device and which already supports an end pivotably in a part of up frame structure or a part of lower frame structure ].

[0021] Since anyone can do it easily comfortably in one hand actuation of one lever at insurance as for adjustment of a snow removal section height location (elderly people and woman), operability improves by leaps and bounds and snow-removal work nature improves.

[0022] The need for a weight balance design of having taken operability into consideration is lost, and the engine performance of snowblower original improves.

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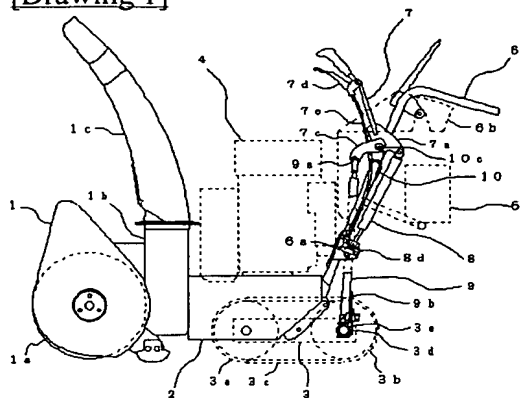
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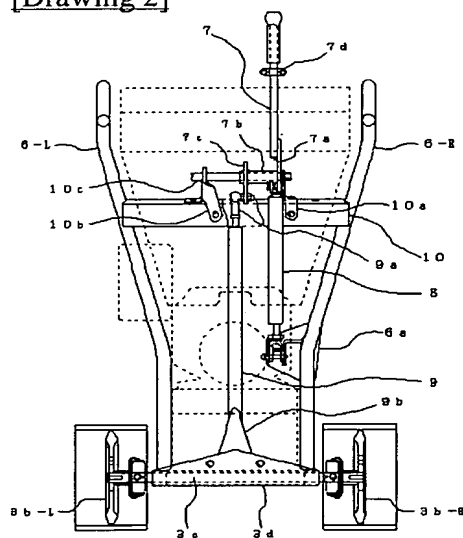
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## DRAWINGS

[Drawing 1]

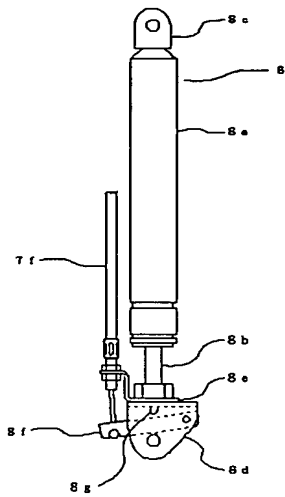


[Drawing 2]

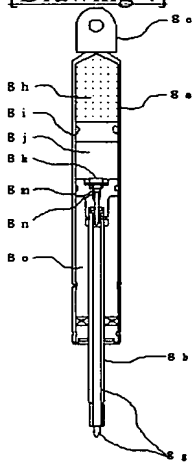


[Drawing 3]

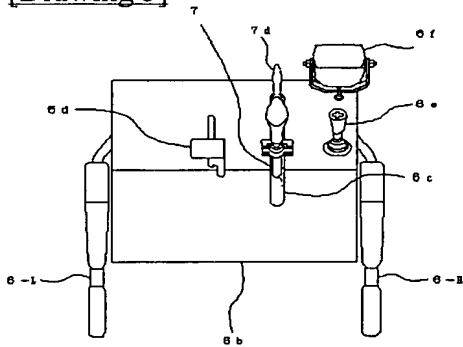




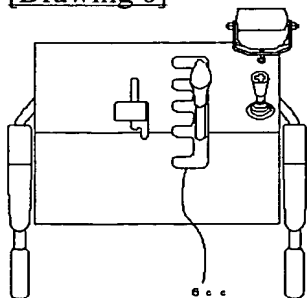
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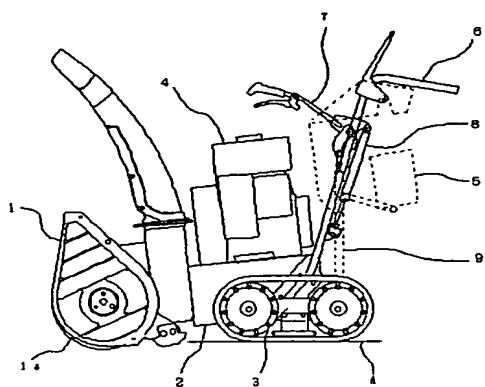
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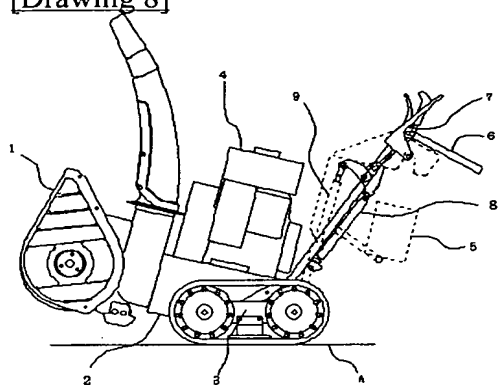
[Drawing 6]



[Drawing 7]



[Drawing 8]



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